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(54) Facade panel supporting device

(57) A panel supporting device for suspending the multi-layer panels 5, 6 of e.g. an all-glass facade from a load-bearing structure. Profiles 11, 11' of the support device extend around the edges of the panels and retain the outer panes 5, 5' by mechanical engagement of edge steps 7, 8 thereon. Front and rear panes 5, 5' forming each panel are adhesively held together as a unit by spacer elements 9, 10 around their edges. To provide extra integrity each profile (11, 11') has an integral stabilising flange 16, 16' that projects bewtween the front and rear panes and is embedded ion a silicone adhesive 15 filled into the edge interspace 24 between the panes. Receiving grooves 20, 21 for the mounting of gap-masking profiles 22 are provided in faces of the profiles directed towards the spaces of division between adjacent panels.

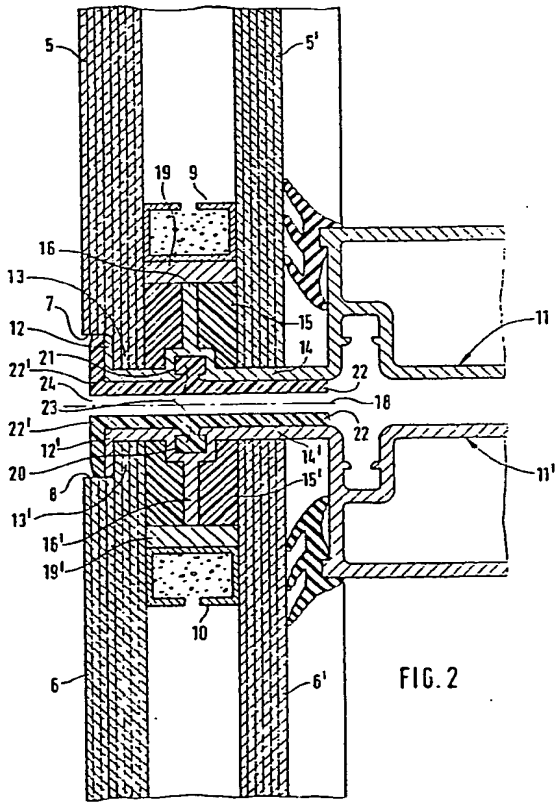

FIG. 2

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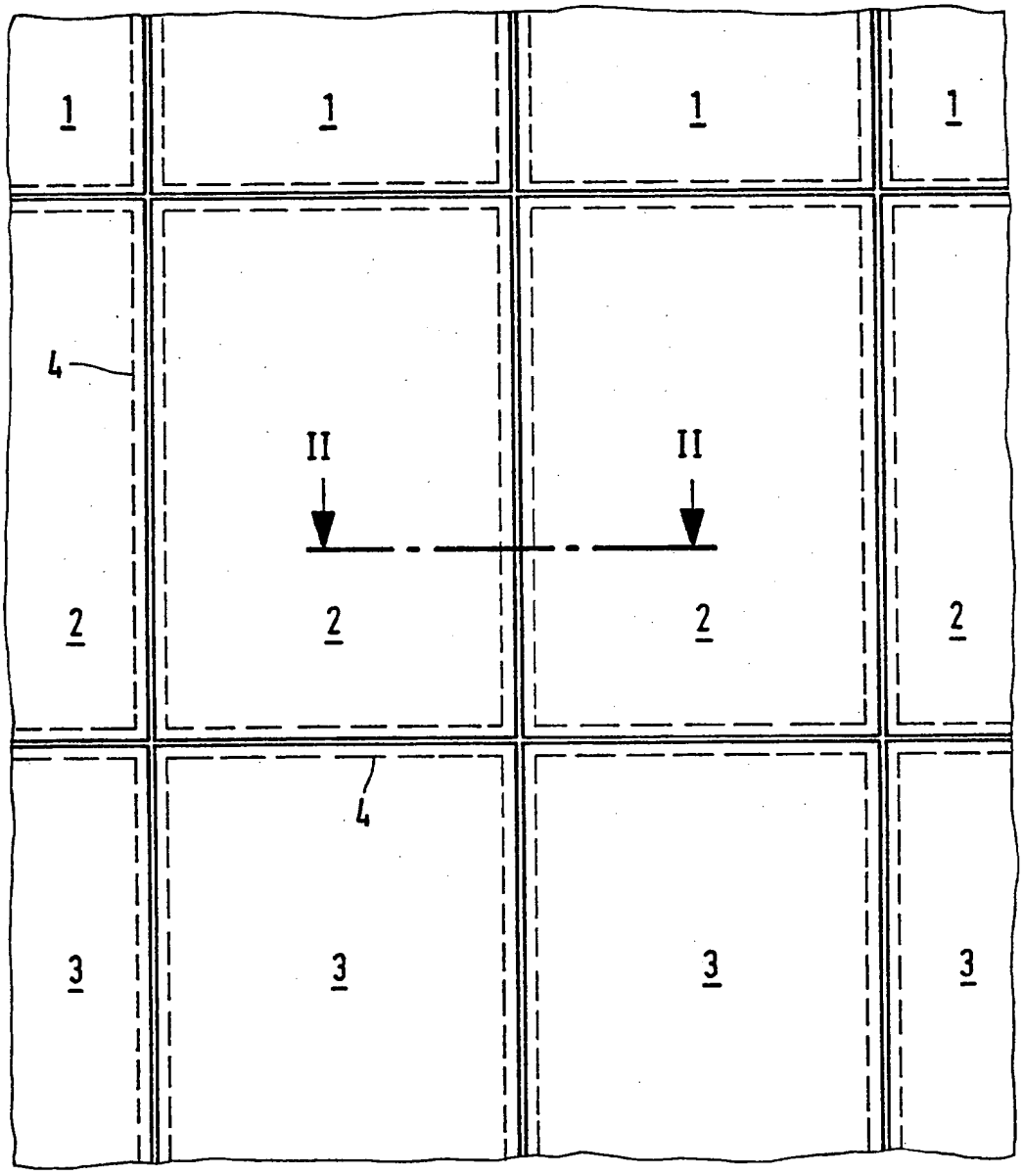

FIG.1

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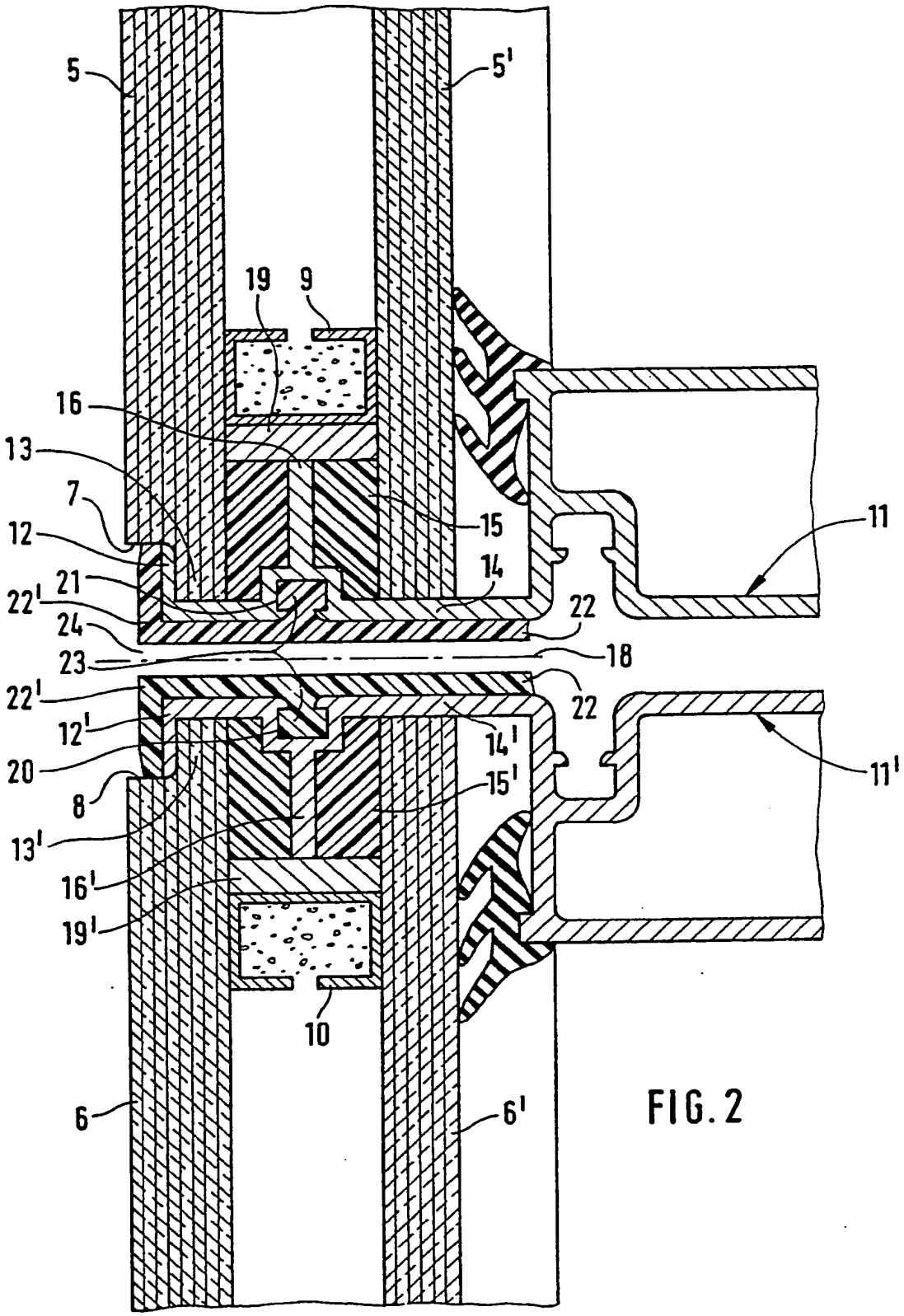

FIG. 2

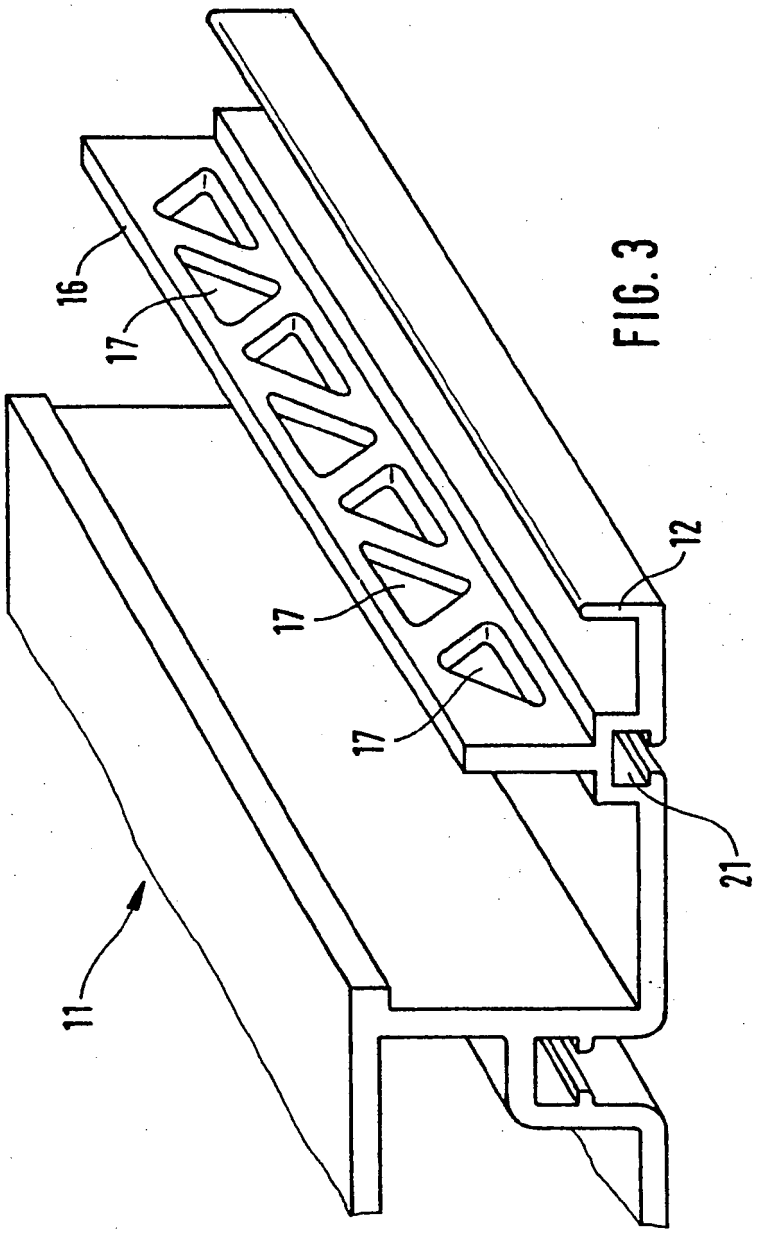

FIG. 3

PANEL SUPPORTING DEVICE

This invention relates to a panel supporting device for the suspension of panels, generally in respective bays, on a supporting structure.

In particular the device is suited for use in a construction (e.g. an all-glass facade) of the type in which each panel is a unit of at least two spaced panes, e.g. of glass, an outer one of which is for forming the facade exterior. The supporting device generally has a cantilever part or the like for securing to the load-bearing structure with an outer angled portion for holding and retaining the panel, usually including engagement with one or more recesses or the like provided at a rim edge of the outer pane.

An all-glass facade structure with a panel supporting device of this kind is known from the applicant company's DE-A-36 24 491. There, the supporting devices comprise supporting strips of generally L-shaped cross-section which extend along the length of the panel rims and, with their outer angled portions, engage behind a step-shaped shoulder of the respective outer pane of an insulating glass unit. As a result, the safety of the outer pane is not dependent exclusively on the adhesive force between the two panes and their spacer elements. Rather, the adhesive bond which exists in any case is supplemented mechanically, as a result of which falling of the outer pane from an individual panel is inhibited, and a source of accident risk is effectively obviated in practice.

However, the structural integrity of the prior art construction is dependent on the solely mechanical connection between the supporting angle members and the outer pane of the glass unit, and on the adhesive bond between the spacer elements and the inwardly-facing pane surfaces.

We now seek to provide for improvement of the panel integrity in this known structure, thereby further reducing the risk of accidents due to detached panes.

In one aspect of the invention, the supporting device accordingly comprises a stabilising portion, which may be a flange, plug, or the like, positioned so as to be in register with the interspace between panes of a panel held by the device, and formed so as to project into that space and be engaged in an adhesive, e.g. a silicone composition, which is to be filled into the interspace.

So, in the completed construction, the interspace formed around the edge of the panel by the edges of the panes and the spacer element set inwardly therefrom has a filling of adhesive composition. The stabilising flange of the supporting device engages into this with the result that greater strength and security can be achieved for the panel bond and mounting. The adhesive e.g. silicone, in the interspace supplements, by virtue of the engagement of the stabilising flange, the mechanical retention of the whole panel as well as the bond between the inner and outer panes.

Another feature of the prior art construction is that gaps between adjacent panels are either filled with a

silicone composition or closed off by a rubber sealing strip. Such seals have the disadvantage of hindering subsequent access when fitting work from the outside of the facade is necessary, and also that they are not always satisfactory in external appearance for the customer.

Thus in another aspect the support device used in the invention has, on the sides directed towards the line of division between panels, housing means for securing gap-masking profiles or the like. The housing means may be e.g. profiled grooves, and in accordance with their shape may provide a stabilising reinforcement of the supporting devices themselves.

Preferably the stabilising flange is continuous along the length of the panel rims, so that on the one hand the rest of the supporting device profiling is given increased rigidity, and on the other hand as large contact surfaces as possible are made available for the adhesive substance. To improve the stabilising effect further, the stabilising flange can consist of plural spaced-apart flange projections from the supporting devices, thus achieving effective mechanical retention of the individual stabilising flanges into the adhesive bed. Or, a continuous flange part may have apertures. This makes connection firmness between the adhesive bed and the flanges particularly effective, since the adhesive composition present in the interspace can penetrate through the apertures in the stabilising flanges and bond with the adhesive composition at the other side to provide mechanical interlock. Alternatively or additionally

it may equally well be advantageous to provide the stabilising flange with protuberances and/or recesses formed in its outer surfaces, as friction-improving contact or engagement surfaces for the adhesive composition.

Preferably the stabilising flange is formed as an integral part of the supporting device by extrusion. Advantageously the stabilising flange is disposed centrally between the panels and running parallel to these. Preferably also the stabilising flange projects transversely with respect to the plane of division between neigbouring panel bays.

According to another preferred feature, the stabilising portion(s) does not extend all the way across the panel interspace to the panel spacer element(s), but terminates at a spacing therefrom. This arrangement ensures that there is no direct connection of the stabilising flanges to the spacer elements. On the one hand the stabilising effect which is in any case achieved is adequate in actual practice. On the other hand, direct connection between the spacer elements and the panel supporting devices may present fabrication or finishing problems. Preferably the interspace is bounded at the panel rim side by abutment surfaces of the supporting device, and at its opposite side by a separating or covering strip. The covering strip is useful on the one hand as a barrier against vapour within the insulating glass panel unit, and on the other hand it forms an inner boundary when the adhesive substance is introduced into the interspace.

Advantageously the housing means for the gap-masking profiles are constituted by housing grooves or the like which are open at their sides directed towards the plane of division between panels. Such masking profiles may be constructed as elastic sealing profiles which cover the outer angled portions of the supporting devices. The sealing profiles advantageously consist of profile strips arranged continuously around the panel edges and may be arranged at a spacing from one another and from the panel bay division plane, adjacent profile strips running parallel. As a result, by suitable construction and selection of different profile forms, the visible joint produced by the spacing gap can be optionally varied.

The invention is described in more detail hereinafter by way of an example, described with reference to the drawings in which:

Fig.1 is a front fragmentary view of an all-glass facade with a plurality of panels;

Fig.2 is a cross-section taken on the line II-II in Fig.1 in the region of a mullion profile; and

Fig.3 shows a supporting strip with a stabilising flange.

The part of an all-glass facade which is illustrated in Fig.1 comprises individual panel bays 1, 2, 3, which are arranged side by side and one above the other in a common plane within the overall glass area, and are secured at their rear side to a facade load-bearing structure of which only parts of the supporting devices are

illustrated, to make the drawings easier to read. The constructional layout of an all-glass facade is described in some detail for example in DE-A-36 24 491 belonging to the applicant company. The facade load-bearing structure consists substantially of individual stanchion or stud profiles of various constructional forms. Instead of conventional metal stud profiles it is also possible to use any other securing arrangements for the load-bearing structure, for example steel or wood frames, or masonry.

Each panel bay comprises outer panels 5, 6 which are formed with a step in cross-section on at least one of their surrounding rim edges 4 in the illustrated constructional example. The steps are designated as 7 and 8. The individual panels comprise inner panes 5', 6' which are situated at a spacing from outer panes 5, 6, the inner panes being nearest to the facade load-bearing structure. The inner panes form an insulating glass unit together with the outer panes. The outer panes 5, 6 and the inner panes 5', 6' are adhesively secured to one another in known manner by spacer elements 9 and 10. The spacer elements 9 and 10 are themselves spaced inwardly from the extreme edges of the panes 5', 5, 6', 6 that they link. The outer and inner panes may be single-layer or multi-layer compound glass panels, or they may be simple panes. In practical use a panel will preferably be chosen which has sufficiently high strength and sufficiently good material properties to allow suitable working of the peripheral edges for forming the cutaway portions or steps 7, 8. Instead of steps it also

possible to choose other shaped or recessed conformations suitable for glass.

It is important that the steps or recesses are in each case provided at the rims 4 of the outer panes 5, 6 so that those panes can have the angled portions of supporting devices 11, 11' engaging behind them.

The supporting devices 11, 11' carried on the lead-bearing structure consist in each case of extruded aluminium profile strips, each of which has an outer angled portion 12, 12' thinner in cross-section than the height of the panel step 7 or 8, and which engages behind the projection 13, 13' of the outer panes 5, 6. The angled portions 12, 12' are situated respectively at the ends of a central web 14, 14' of the profile strips 11, 11', to form in effect glass holding ledges. The central webs 14, 14' extend transversely relative to the longitudinal plane of each panel, and abut on the peripheral rims 4 of the panels 5, 5'; 6, 6'. At their ends remote from the angled portions 12, 12', at the inner face of the panel assembly, the central webs merge into a profile form which allows satisfactory abutment of the panel assembly at the inner panes 5', 6', and reliable fastening to a load-bearing structure not shown here, for example a stud profile.

The supporting devices 11, 11' comprise in the region of their central webs, at the level of the panel interspace 15, 15', laterally projecting stabilising flanges 16, 16' which extend into an adhesive composition filling parts of the interspace 15, 15', and consisting for

example of silicone. The flanges are bonded securely into the adhesive bed and extend continuously, with the central webs 14, 14' along the length of the panel edges. However, in other embodiments they may equally well be interrupted, e.g. in the manner of comb teeth (not shown) over the said length. Fig.3 shows the flanges 16, 16' provided along their length with a series of apertures 17, to provide as is preferred a mechanical interlock as well as adhesive bonding into the silicone bed. The apertures may be formed by e.g. milling or punching.

The stabilising flanges 16, 16' are formed integrally on the central webs 14, 14'. They extend approximately centrally between the panels 5, 5' and 6, 6', transversely with respect to the plane of division 18 between two neighbouring panels, and running parallel to the panels. Variants of the form of the stabilising flanges which is shown in the drawings are, of course, also possible. However, it is important that, when the panels are assembled, there should be transmission of forces between the bed of adhesive substance in the interspace 15, 15', the stabilising elements, and the other components of the supporting devices, into the load-bearing structure in order to stabilise the panel assembly as a whole. The rims of the stabilising flanges engaging into the silicone-filled interspaces 15, 15' have no direct contact with the spacer elements 9, 10, and instead terminate at a spacing from these, with interposition of a covering strip 19, 19' which can be of known type. An extruded aluminium profile,

or a strip made from a material having poor thermal conduction properties, for example synthetic plastic material, may be used for the supporting devices 11, 11', depending on the intended circumstances of use in each case.

Figs.2 and 3 show that the supporting devices 11, 11' have, in the face regions of those sides of their central webs 14, 14' which are directed towards the panel bay division plane 18, opposite from the stabilising flanges 16 and 16', moulded-in housing grooves 20, 21 which open towards the spacing gap and which are intended for the releasable securing of gap-masking profiles 22 which are constructed as elastic sealing profiles extending continuously on the panel rims, said gap-masking profiles likewise having outer angled portions 22', with which they mask from view from the exterior angled portions 12, 12' of the central webs 14, 14'. These gap-masking profiles can be pressed releasably, with the appropriately formed-on retaining portions 23, into the grooves 20, 21. They can be constructed to allow the forming of a neat, visually attractive, exterior joint. Of course, instead of being in two parts the gap-masking profiles 24 may also be made in one piece, and cover the gap externally completely, i.e. without leaving a visible join.

Instead of the stabilising flanges 16, 16' formed with apertures shown in Fig.3, it is also possible to use stabilising flanges which are uninterrupted, but in that case they may be provided with protuberances and/or recesses incorporated in their outer surfaces, with the intention of

constituting a friction-increasing engagement or contact surface for the adhesive composition in the interspace.

CLAIMS

1. A panel support device for the suspension, in respective panel bays on a bearing structure, of panels each comprising a unit of at least inner and outer panes held spaced from one another, the support device comprising:

cantilever portions for securing to the bearing structure;

outwardly-extending portions for engaging the panel edges, comprising outer angled portions for engaging corresponding outer edge parts of the outer panel panes, to retain the panels mechanically;

stabilising portions on the outwardly-extending portions, disposed to register with and project into the peripheral interspace between the inner and outer panes of supported panels, to engage in a filler composition; and

at parts directed away from the panel edge engaging portions and towards an inter-panel division line, receiving means for the securing of covering elements for the device.

2. A panel support device according to claim 1 wherein the stabilising portions extend substantially entirely along the panel edge engaging portions of the support device.

3. A panel support device according to claim 1 or claim 2 wherein the stabilising portion is a flange.

4. A panel support device according to claim 1 or claim 2 wherein the stabilising portion comprises a series of spaced-apart individual projections.

5. A panel support device according to any one of claims 1 to 4 wherein the stabilising portion has apertures to be engaged by the filler composition.

6. A panel support device according to any one of the preceding claims wherein the stabilising portion is provided with protuberances to engage in the filler composition.

7. A panel support device according to any one of the preceding claims wherein the stabilising portion is an integrally-extruded part of the device.

8. A panel support device according to any one of the preceding claims in which the stabilising portions project transversely relative to the planes of division between neighbouring panel bays.

9. A panel support device according to any one of the preceding claims in which the receiving means comprise housing grooves opening towards the planes of division between neighbouring panel bays.

10. A panel support device according to any one of the preceding claims in which the covering elements are elastomeric sealing profiles formed so as to mask the outer angled supporting device portions.

11. A panel support device according to any one of the preceding claims in which each covering element is an elastomeric profile strip extending continuously around a panel bay.

12. A panel support device according to any one of the preceding claims in which adjacent covering elements run parallel with one another, spaced on either side of the

plane of division between their respective bays.

13. A facade comprising a plurality of panels, each panel being a unit with at least an outer pane at the facade exterior joined to and spaced from an inner pane by at least one panel spacing element, the panels being suspended in respective bays of a panel support device according to any one of claims 1 to 12, with an adhesive composition filled into the peripheral interspace between the panel panes and the stabilising portions of the support device being engaged in the adhesive composition.

14. A facade according to claim 13 wherein the panes are made of glass.

15. A facade according to claim 13 or claim 14 wherein the stabilising portion extends centrally between the panes and parallel thereto.

16. A facade according to any one of claims 13 to 15 wherein the projecting stabilising portions terminate spaced from the panel spacer elements.

17. A facade according to any one of claims 13 to 16 wherein the interspace is delimited by panel-abutting surfaces of the support device, the panes, and by a covering strip between the panes.

18. A facade according to any one of claims 13 to 17 wherein the outer panes have peripheral stepped recesses for engagement by the angled portions of the support device.

19. A panel support device, or panel facade incorporating such device, substantially as described and shown herein with reference to the drawings.

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